

Function Transformations 1

Please download the file `FunctionTransformations1.ggb` from my GeoGebra directory. Launch GeoGebra and open that file.

At the top of the drawing pad, you should see a slider showing “Page=1”. Below that, find an equation for line n , which is graphed nearby. You can find another equation for line n in the Algebra Window at left.

1) Move A to (1,0). What are the two equations for line n ? Write them down.

2) Move A to (2,1). How did the equations change? Why did one change but not the other?

3) Predict what the two equations will become when you move A to (3,4), and write down your prediction. Move A to (3,4). Were you right?

4) Move A to (-2,1). Now what are the equations?

5) Predict what the two equations will become when you move A to (5,-1), and write down your prediction. Move A to (5,-1). Were you right?

6) Suppose A is moved to any point (a,b) . What will the two equations become? Test your formula on at least two points we haven't tried yet.

Move A back to (0,0), and then move the dot on the Page slider to Page=2.

7) What are the two equations for parabola p ?

8) Move A to (0,1) and then (0,2). What seems to be happening with the two equations? Is it easy to see that they are equivalent?

9) Move A to (0,0), (1,0), (2,0), and finally (3,0). Now how do the equations change?

10) Describe what you would do to the equation in the drawing pad, which should currently be $y = (x - 3)^2 + 0$, in order to get the equation in the algebra window, $y = x^2 - 6x + 9$.

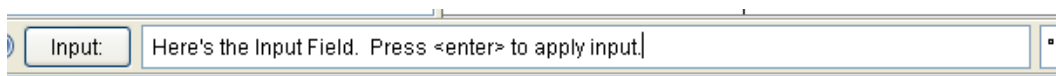
11) Can you do the reverse—that is, turn $y = x^2 - 6x + 9$ into $y = (x - 3)^2 + 0$? Do you know what that process is called?

12) Move A to (2,1). How might you convert the equation $y = (x - 2)^2 + 1$ into the equation $y = x^2 - 4x + 5$?

13) Can you factor $x^2 - 4x + 5$? If so, check your work.

14) Here's a different equation: $y = x^2 - 4x + 3$. Can you factor it? Can you find its roots? Can you convert it into the form $y = (x - h)^2 + k$? Move A to (2,-1) to check your work.

Advance the Page slider to Page=3. Enter “ $y=x \sin(x)$ ”, or any other function of your choosing, into the Input Field (pictured below); then, drag the graph around the drawing pad and watch how its equation changes.



The image shows a software interface with a blue border. On the left, there is a small icon of a document. To its right is a button labeled "Input:". Further right is a large text input field containing the text "Here's the Input Field. Press <enter> to apply input". To the right of the input field is a small square button with a dot inside.